ETM: Upper Class E Traffic Management

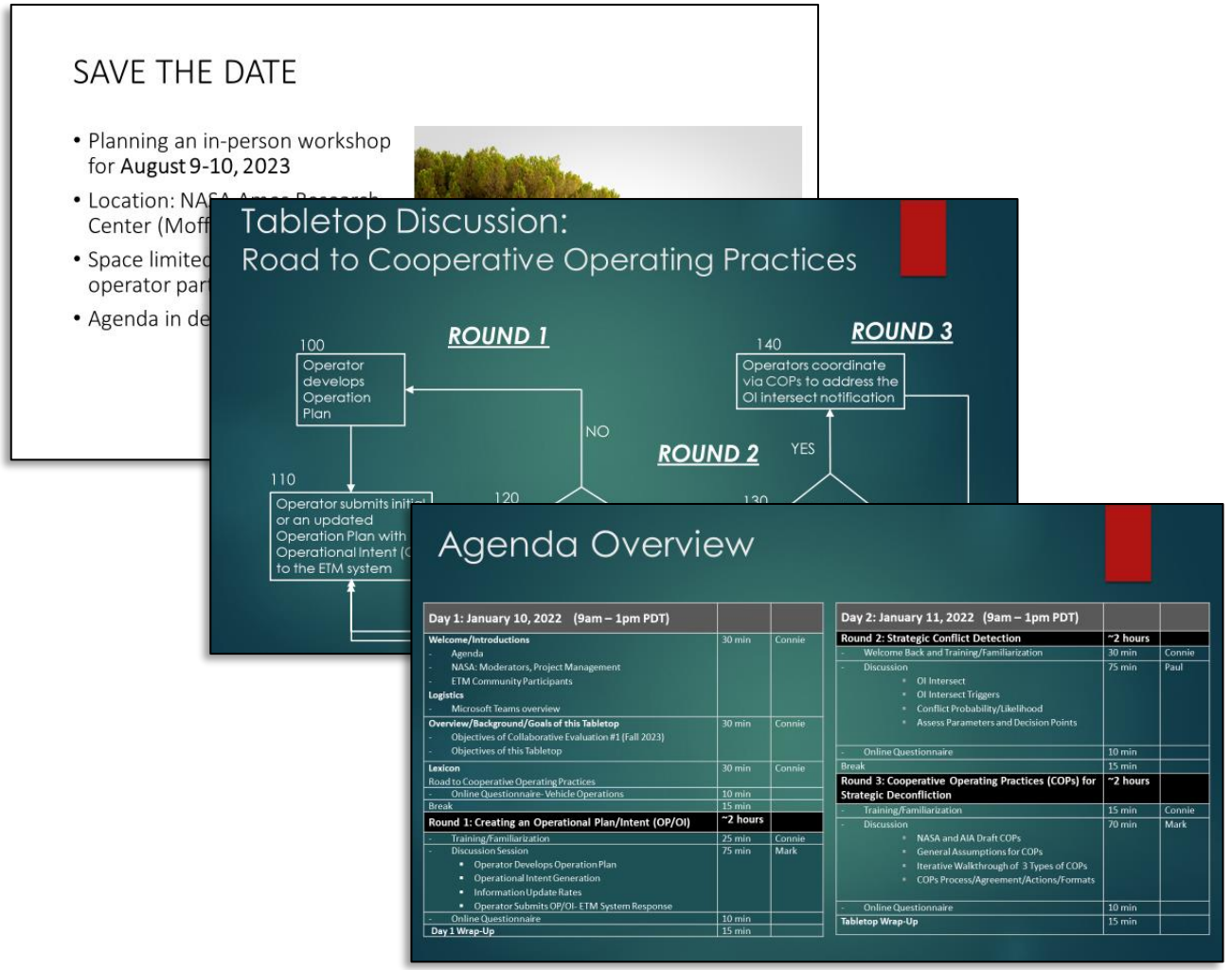
November 17, 2023

Recap

Pre-decisional

Last Full Meeting: May 2023

- News and Updates
  - NEBP update
  - AIA update
- Cross-Domain Perspectives on COPs
- NASA-Hosted Tabletop Summary
- Collaborative Evaluation Update
- Summer ETM Workshop Announcement



Agenda

- News and updates
  - HAPS Alliance Meeting
  - Industry news
  - NASA Science Mission Directorate
- ETM Workshop Summary
- International Trust Framework
- NASA evaluation update
- Looking ahead

Pre-decisional

News & Updates

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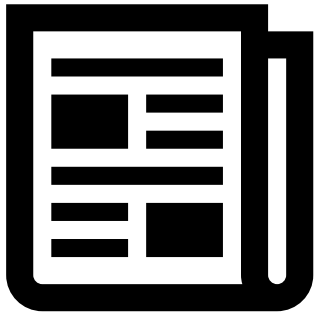
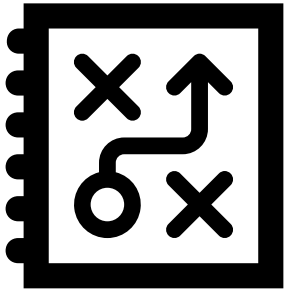


News

Testing

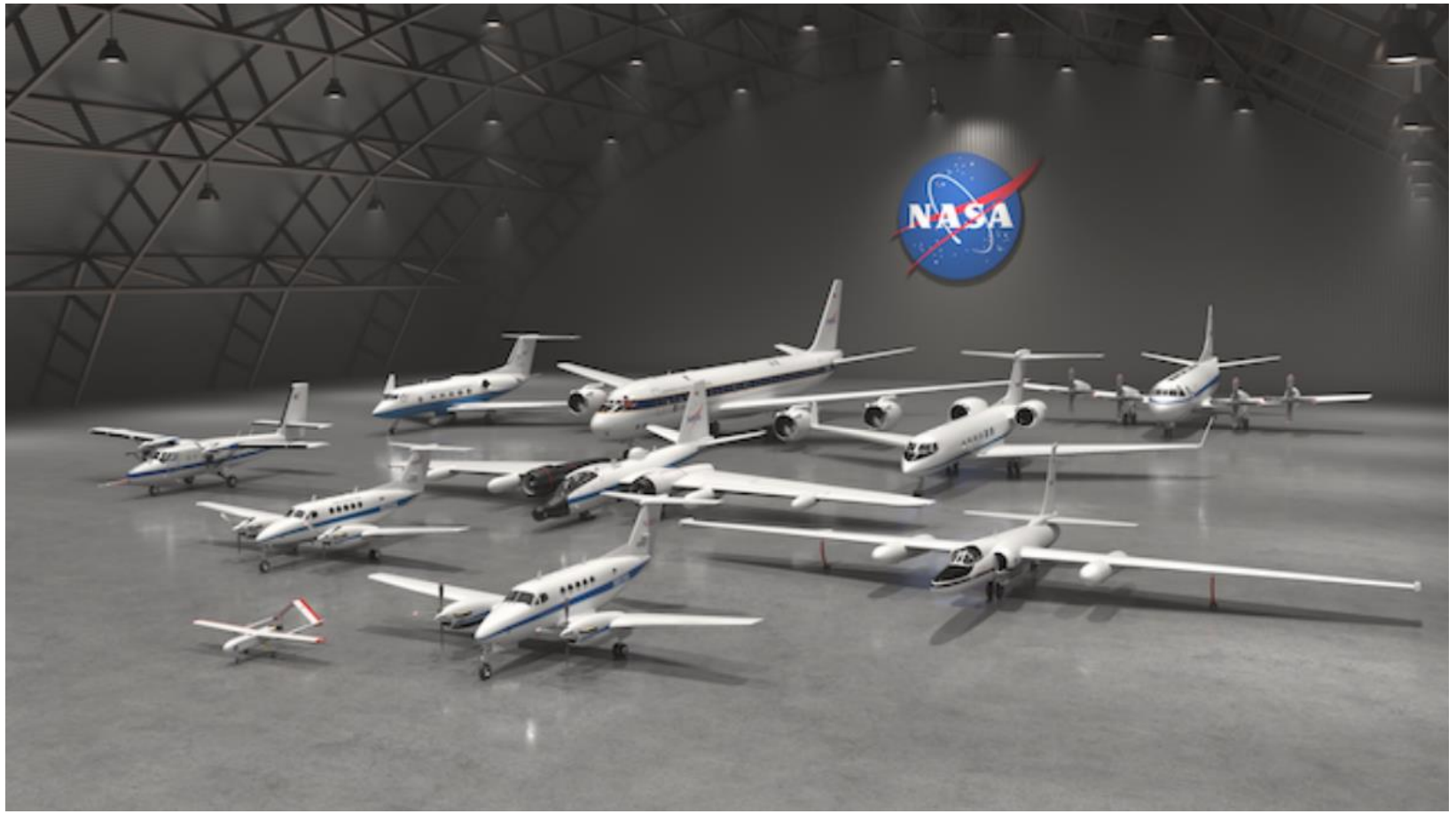


Plans

News & Updates

NASA Science Mission Directorate (SMD)

Airborne Science Program



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2023 ETM Workshop Summary

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ETM

UPPER CLASS E
TRAFFIC MANAGEMENT

ETM Workshop

August 9-10, 2023

Location: NASA Ames Research Center

Day 1: Agenda

Objective: Present the research and analysis associated with technologies and ETM concepts to date

Time (PST)	Topic	Presenter
9:00 - 9:30	Welcome, Introductions, & Agenda Overview	NASA/All
9:30 – 10:00	ETM: Project History and Overview	NASA/FAA
10:00 – 10:20	Cooperative Areas Overview	FAA
10:20 – 10:30	**Break**	
10:30 – 11:15	Status of Technology and Testing | Industry Update	Industry
11:15 – 12:00	Status of Technology and Testing FAA Analyses | Aircraft ID | Flight Plan Filing	FAA
12:00 – 1:00	**Lunch**	
1:00 – 2:00	Status of Technology and Testing Architecture View | NASA (CE1) | NASA Negotiation Model	NASA
2:00 – 2:15	Day 2 Overview – Cooperative Operating Practices (COPs) Development	FAA/NASA
2:15 – 4:00	Lab Demonstration	NASA
	Happy Hour at the Space Bar	

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Day 2: Agenda

Objective: Continue Cooperative Operating Practices (COPs) development for ETM

Time (PST)	Topic	Presenter
9:00 – 9:15	Welcome & Regroup	All
9:15 – 10:15	Outcomes of NASA & FAA COPs Development Working Sessions	FAA/NASA
10:15 – 10:30	**Break**	
10:30 – 11:30	COP Breakout Session #1 *Cooperative Areas Management & Transfer of Services*	Industry
11:30 – 12:15	COP Breakout Session #1 Debrief	Industry
12:15 – 1:15	**Lunch**	
1:15 – 2:15	COP Breakout Session #2 *Technical Capabilities to Support ETM*	Industry
2:15 – 3:00	COP Breakout Session #2 Debrief	Industry
3:00 – 3:10	**Break**	
3:10 – 3:30	Next Steps & Closing Remarks	All

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Lexicon

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Definitions

Cooperative Areas (CAs): FAA-designated volumes of airspace within which operators manage their operations in accordance with Industry-developed, FAA-approved COPs

Cooperative Operating Practices (COPs): Industry-defined, FAA-approved practices addressing how airspace users manage operations in cooperative areas are operator-defined, FAA-approved practices that define how airspace users will conduct their operations in concert with all stakeholders.

Cooperative Operating Environment (COE): Environment where separation is maintained using cooperative traffic management practices; operations inside CAs are in the COE.

*Formerly termed Cooperative Control Environment, CCE

Cooperative Areas

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NOTE: This report is meant to provide a high-level summary of discussions occurring during the two-day ETM workshop. None of the content is intended to endorse certain positions or dictate policy.

CA Takeaways

- Terms and conditions for establishing and changing CAs are established by FAA and Industry – FAA approves the release and/or redefinition of airspace when conditions are met
- Operators do not receive Air Traffic Services (ATS) while operating in CAs
- Operators continually share revised flight intent with each other and strategically deconflict
- Operators either self-provision or utilize third party services to support their operations

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CA Management Breakout

- CAs may require a community-based compliance mechanism or protocols or reporting of non-compliance to the FAA
- During transfer from ATC, operators must check into the COE so people know they are there
- There is ongoing work at the ICAO level to enable use of COPs in high altitude airspace

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Transfer of Services Breakout

- There should not be predetermined entry/exit points within a CA: introduces unnecessary risk
- Transfer of service model should model current NAS processes and procedures where possible
- Operators must be able to share position information, particularly at a transition point, for other operators to maintain situational awareness

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Technical Needs in ETM Breakout

- There can be discrepancy in altitudes when two operators are transitioning through the same altitude due to different use of barometric vs. geometric altitude
- ATC generally want to keep a consistent altitude reference in MSL
- Operations within a CA should use the same altitude reference
- Altitude reference often transitions at a particular altitude. This transition point needs to be considered for CAs that potentially extend down to this altitude

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Comms, Nav, & Surveillance Breakout

- There should be a standard means of communication between operators in COE
- Interactions between operators should be enabled through digital comms. Solution must meet defined performance requirements
- Vehicle-to-Vehicle communications solutions need to be determined
- Ground-to-ground communication between ATC and operators is critical for many ETM participants. Where possible, existing solutions should be considered to avoid developing an entirely new architecture

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International Trust Framework

Léonard Bouygues

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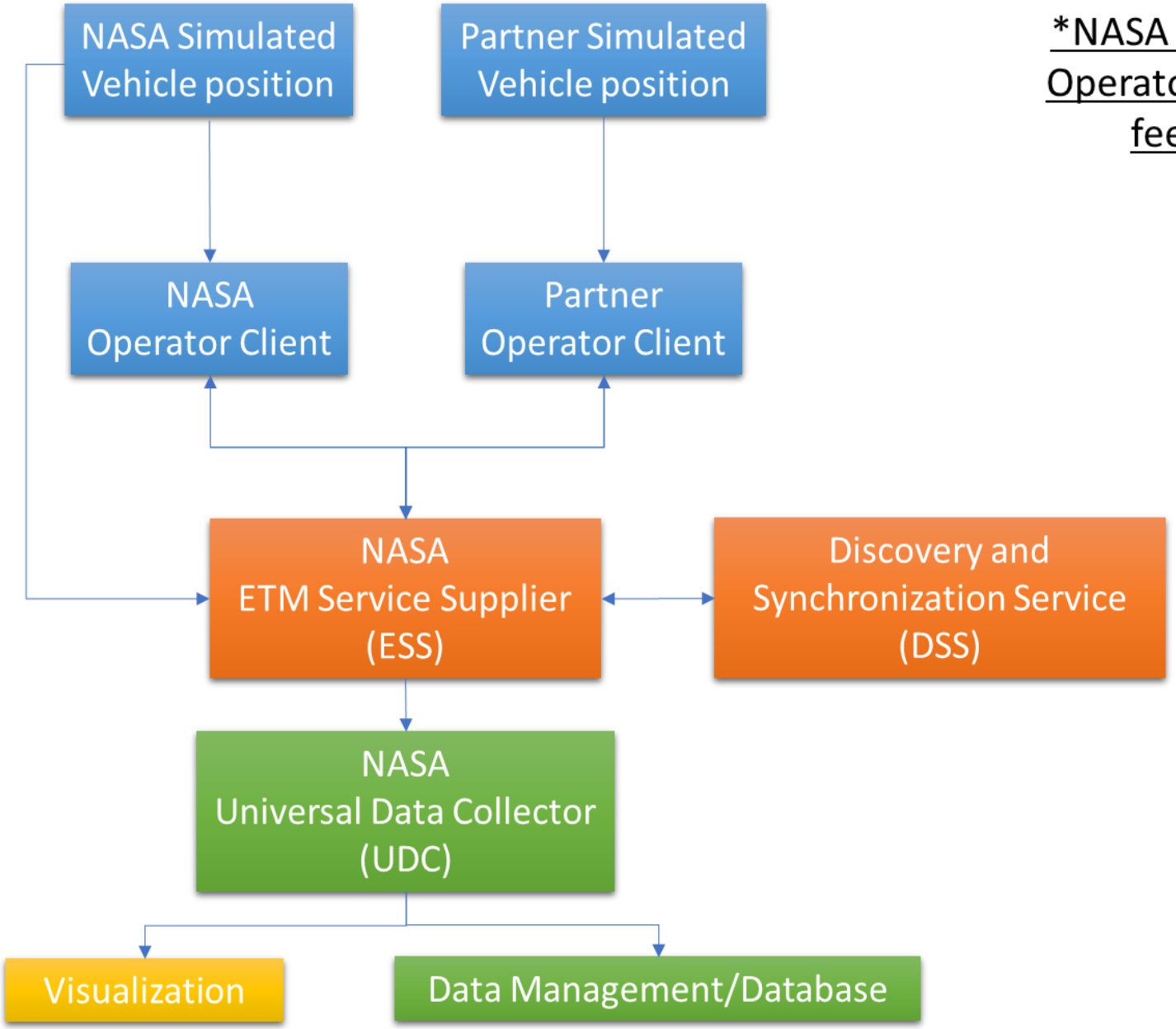
Collaborative Evaluation Update

ETM System Architecture



*NASA can serve as an Operator with partner-feed position

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Operator/Position
Airspace System
Data Management
Visualization

CE-1 Update

Gufi	Vehicle	Callsign	State	Controls	Sensitivity
3e60	ETM: Balloon	AOL-B001-A1-	Activated	cancel connect activate close	NON-SENSITIVE
b152	ETM: AirShip	AOL-A002-A1	Activated	cancel connect activate close	NON-SENSITIVE
7c00	ETM: Solar Fixed Wing UnCrewed	AOL-H003-A1	Activated	cancel connect activate close	NON-SENSITIVE
eb65	ETM: Global Hawk	AOL-GH001X-A1	Activated	cancel connect activate close	NON-SENSITIVE

Pre-decisional

ETM vehicles simulated

1. High Altitude Balloon
2. HALE Airship
3. Solar Powered Fixed Wing Uncrewed
4. Global Hawk

- 4 distinct operators submitted Operation Plans (OI volumes and waypoint plan) using the xTM Client to ESS.
- Operation state transitions registered on the connected ETM platforms.
- Test accomplished demonstration on nominal operation with non-conflicting Operation Plans.
- Upcoming tests (late November): OI intersect and Conflict Probability

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Wrap up

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Questions?

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